

REMARKS/ARGUMENTS

Amendment

Claims 19-24 and 31 have been examined. Claim 19 has been amended and claim 20 has been cancelled. Reconsideration of the claims, as amended, is respectfully requested.

Claim Rejections – 35 USC 103

Claims 19-24 and 31 have been rejected under 35 USC 103(a) as being unpatentable over Nakamura in view of JP 62-238,062 (“JP ‘062”). This rejection is respectfully traversed.

As presently pending, independent claim 19 recites that the first part of the die is heated to a temperature above the liquidus temperature of the metal while the second part of the die is maintained at a temperature below the liquidus temperature of the metal. The Office Action recognizes that Nakamura fails to teach this limitation and relies upon JP ‘062 in an attempt to cure this deficiency in Nakamura. However, this limitation is also not taught or suggested by JP ‘062. As such, a prima facie case of obviousness has not been established as to claim 19.

More specifically, in rejecting claim 19, the Office Action maintains that JP ‘062 discloses the step of heating “the first part of the die 5 to the melting point of the metal to facilitate the infiltration process”. Further, the Office Action cites US 6,360,809 to Cornie et al as evidence that “it is common practice to preheat the mould to a temperature above the liquidus temperature to prevent premature solidification of the molten infiltrant”. The Office Action still further alleges that “it is apparent that the second part of the die of Nakamura et al or JP ‘062 is maintained or it would have been obvious to maintain it at a lower temperature to speed up the cooling process”.

Applicant disagrees for several reasons. First, Cornie et al relates to high throughput pressure infiltration casting. While Cornie may disclose preheating the mould to a temperature above the liquidus of the metal (see column 18, lines 56 to 67 which mention

temperatures of 250C to 500C above the liquidus), the entire mould assembly (comprising mould vessel 12 and mould 14) of Cornie et al is heated to such temperatures, not just the inner part 14. This is evident because the entire mould assembly is heated in a furnace. Hence, Cornie teaches away from the invention by heating the two parts together at the same temperature. In contrast, the method of claim 19 maintains the two parts of the die at different temperatures (one above, the other below the liquidus). This is a critical feature that is not taught by Nakamura, JP '062 or Cornie. Put simply, none of the three references cited in the Office Action teaches this limitation. Hence, claim 19 is distinguishable without amendment.

However, in order to expedite prosecution, claim 19 has been amended to include the limitations of claim 20 which recites the step of:

“removing the first part of the die from the second part after solidification, and cooling the first part independently of the second part before removing the solidified component from the first part.”

This step is also not taught by the cited art. Indeed, with Cornie et al the entire mould assembly is cooled to produce a solidified cast product that can be recovered from the mould (see Figure 6). In other words, the mould vessel 12 and mould 14 are not separated so that one may cool independently of the other. Thus, in order to achieve a high throughput, many mould vessels are required, and must be heated simultaneously since preheating takes the greatest time. In contrast, separating the first and second parts of the die as claimed in claim 19 allows the first part to cool independently of the second part before removing the solidified component from the first part. This allows fast casting cycle times without the need for multiple second parts of the die. Hence, claim 19 is distinguishable for this additional reason.

In rejecting dependent claim 20 (which is now incorporated into claim 19), the Office Action indicated that “since the inside mould of Nakamura et al is separable from the outside mould, it would have been obvious to remove the inside mould from the outside mould after solidificationto speed up the cooling process”. Applicants disagree. This is contrary to the disclosure of Nakamura et al, in which the mould 18 is divided into two parts, namely a

stationary part 24 and a moveable part 26, by parting faces 22 that extend in the vertical direction. The stationary part 24 comprises an outside main mould 24a and an inside sub mould 24b; and the moveable part 26 comprises an outside main mould 26a and an inside sub mould 26b. In order for the mould 18 to open as shown in Figure 1, the inside sub moulds 24b and 26b must be secured to their respective outside main moulds 24a and 26a. This means that it is not possible with the Nakamura et al arrangement to remove the inside sub moulds from the outside main moulds after solidification, and cool the inside sub moulds independently of the outside main moulds before removing the solidified component from the inside sub moulds. Furthermore, the provision of extruding pins 42 (which pass through outside main mould 26a and inside sub mould 26b) for ejecting the cast component from the recess 14 emphasizes that the solidified component must be ejected from the mould 18 without cooling the inside sub moulds 24b and 26b independently of the main outside moulds 24a and 26a.

Likewise, in JP '062 there is no provision for cooling one part of the die independently of any other part of the die. Finally, in Cornie et al, the mould vessel 12 and mould 14 are cooled simultaneously as explained above. Hence, none of the three references cited in the Office Action teaches this limitation. As such, claim 19 is distinguishable for this additional reason. Claims 21-24 and 31 depend from claim 19 and are distinguishable for at least the same reasons.

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Amendment under 37 CFR 1.114
Request for Continued Examination

PATENT

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance and an action to that end is respectfully requested.

Further, the Commissioner is hereby authorized to charge any additional fees or credit any overpayment in connection with this paper to Deposit Account No. 20-1430.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 303-571-4000.

Respectfully submitted,

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